United States Patent [19]

Harty

[11] **3,877,087**

[45] **Apr. 15, 1975**

[54] **CONVERTIBLE COUCH AND MECHANISM THEREFOR**

[75] Inventor: **M. Fillmore Harty,** Bloomfield Hills, Mich.

[73] Assignee: **The Dow Chemical Company,** Midland, Mich.

[22] Filed: **May 9, 1974**

[21] Appl. No.: **468,303**

[52] **U.S. Cl.** **5/13;** 5/29; 5/36

[51] **Int. Cl.** **A47c 17/14**

[58] **Field of Search** ..... 5/12, 28, 17, 35, 18, 36, 5/31, 30, DIG. 1, 309, 355, 361, 421; 297/440, 456, 111, 118, DIG. 1, DIG. 2

[56] **References Cited**

UNITED STATES PATENTS

3,070,402	12/1962	Stanton	297/421
3,432,203	3/1969	Cavalli	5/13
3,642,323	2/1972	Taylor	297/456
3,751,739	8/1973	Assmann	5/28
3,761,130	9/1973	Suzuki	297/440

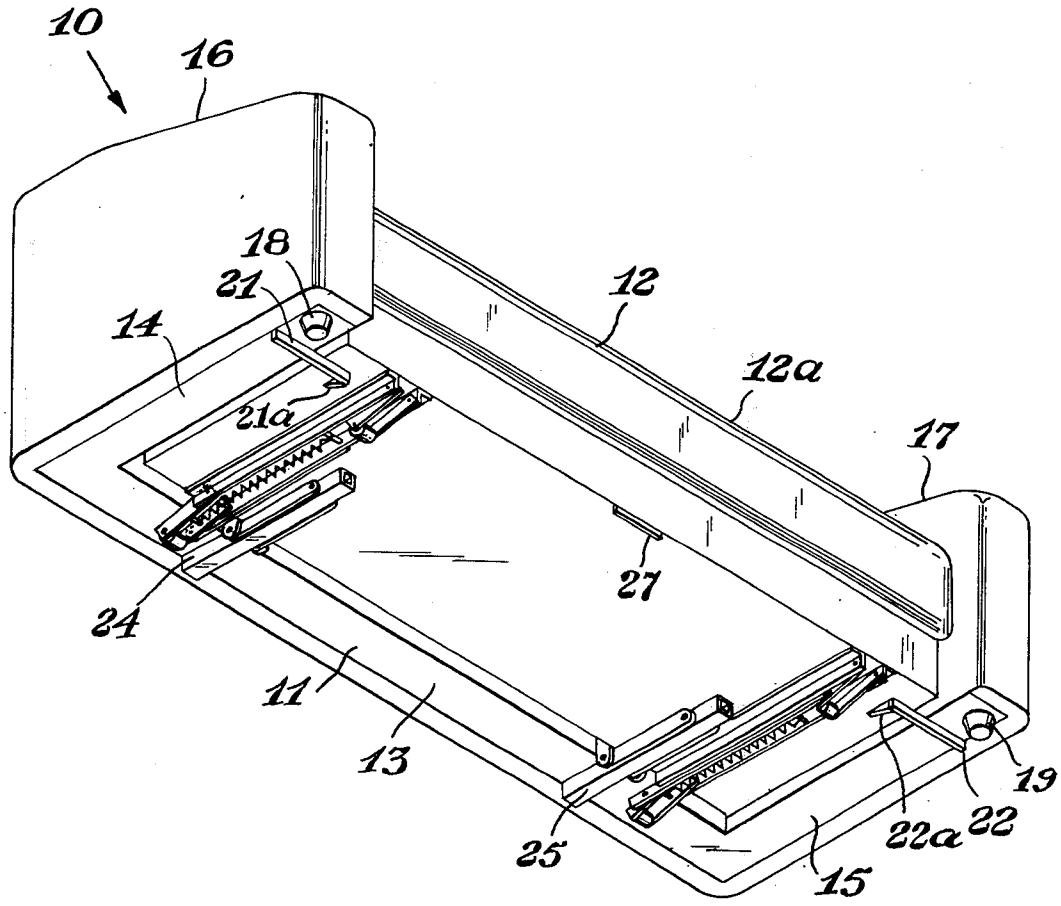
Primary Examiner—Casmir A. Nunberg

Attorney, Agent, or Firm—Robert B. Ingraham

[57] **ABSTRACT**

A convertible couch is shown which is constructed principally of various plastic foams and has an extending mechanism which permits conversion to a bed having a sleeping surface of normal bed height when opened. Construction of the couch is simple, lightweight and permits ready and rapid conversion from couch to bed with minimal physical effort and hazard.

19 Claims, 8 Drawing Figures



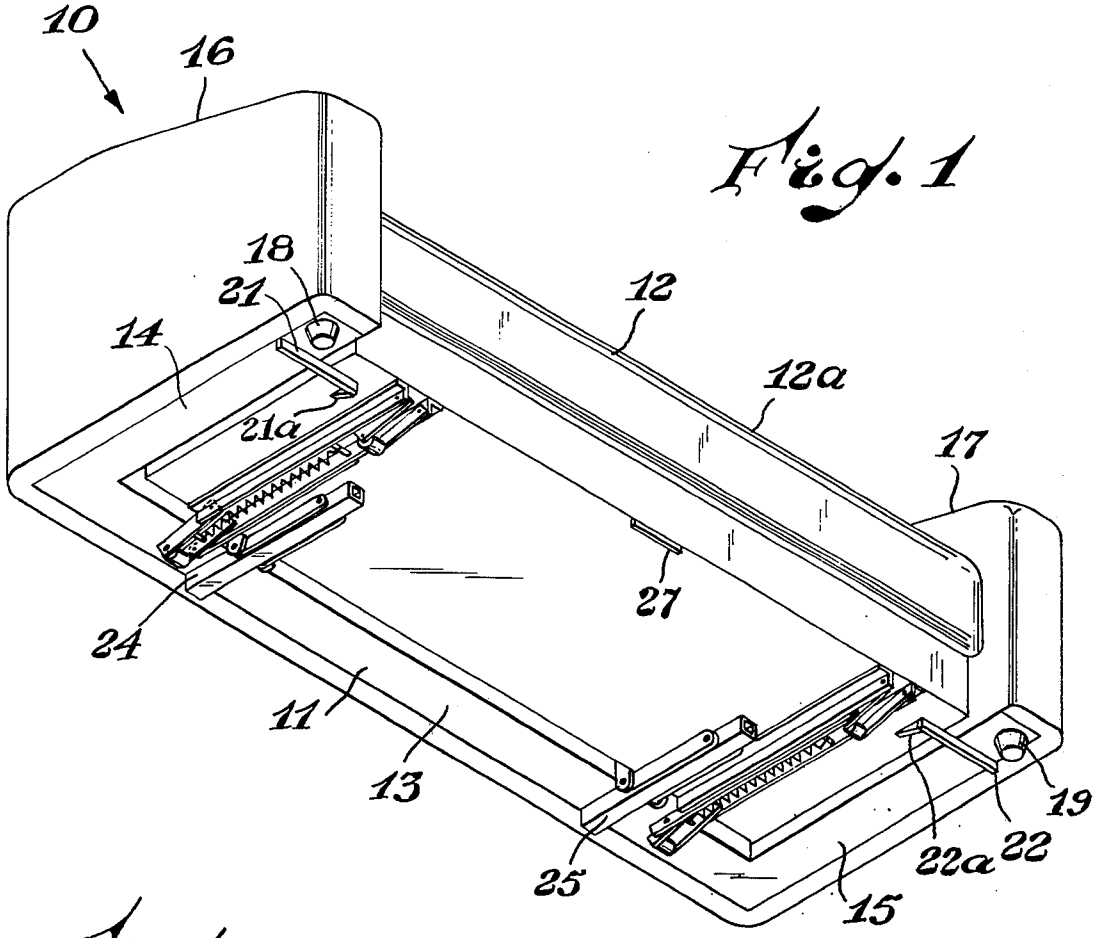

10
16
18
21
14
21a
12
12a
17
27
24
11
13
25
15
22a
22
19

Fig. 1

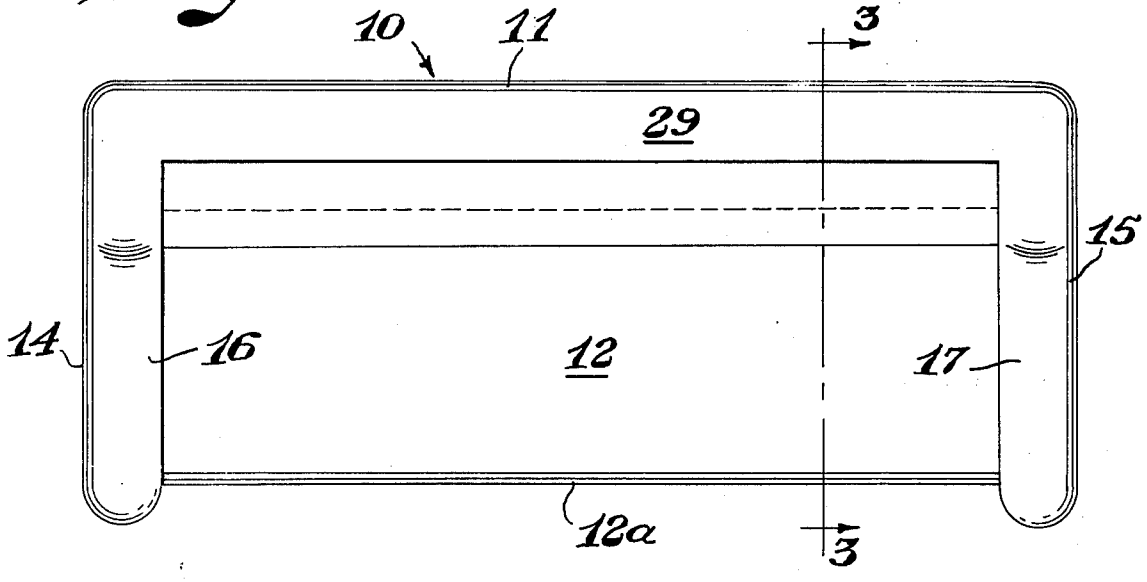

10
11
3
29
15
14
16
12
17
12a
3

Fig. 2

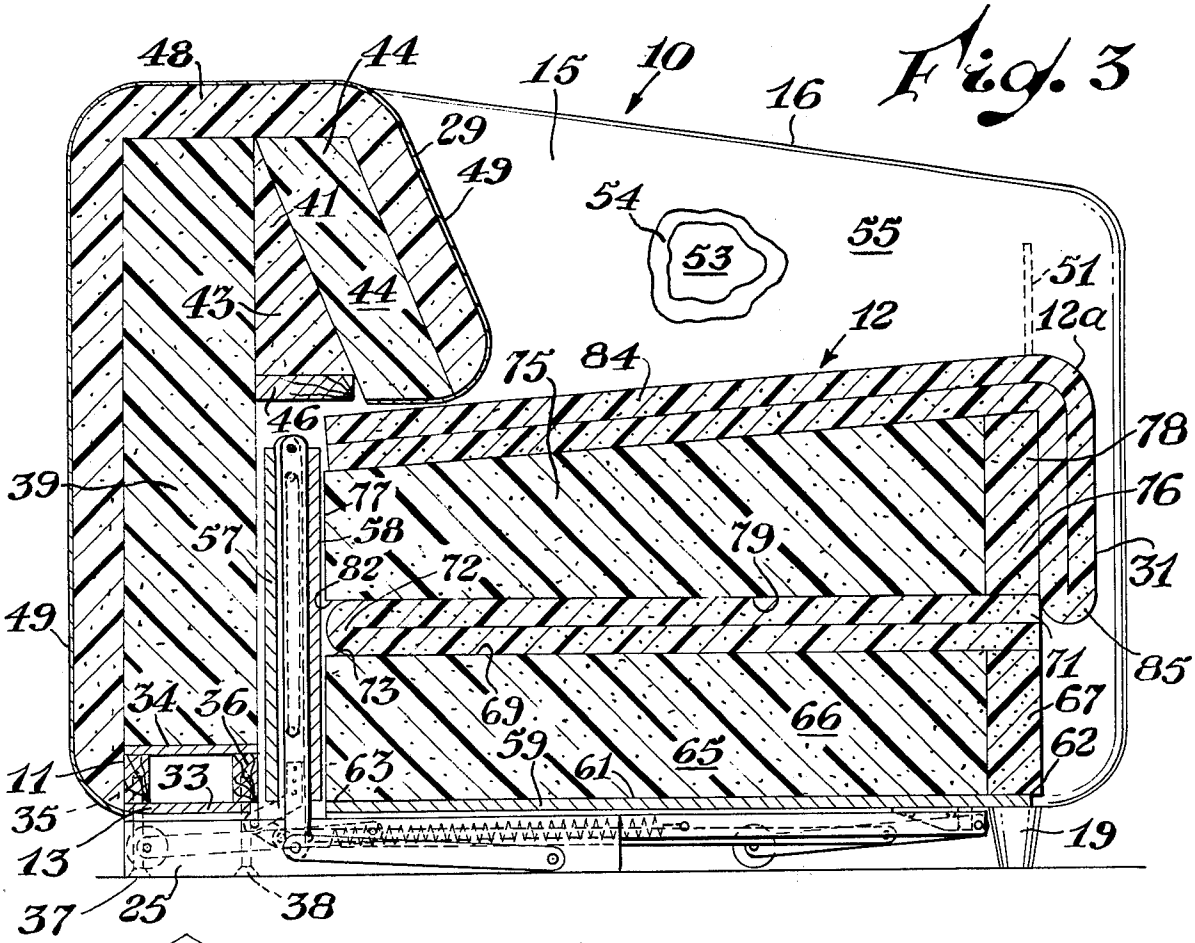


Fig. 3

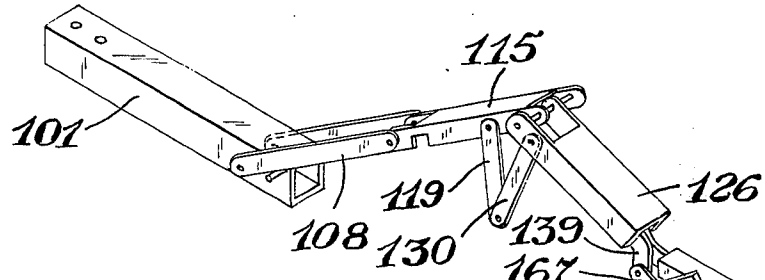


Fig. 7

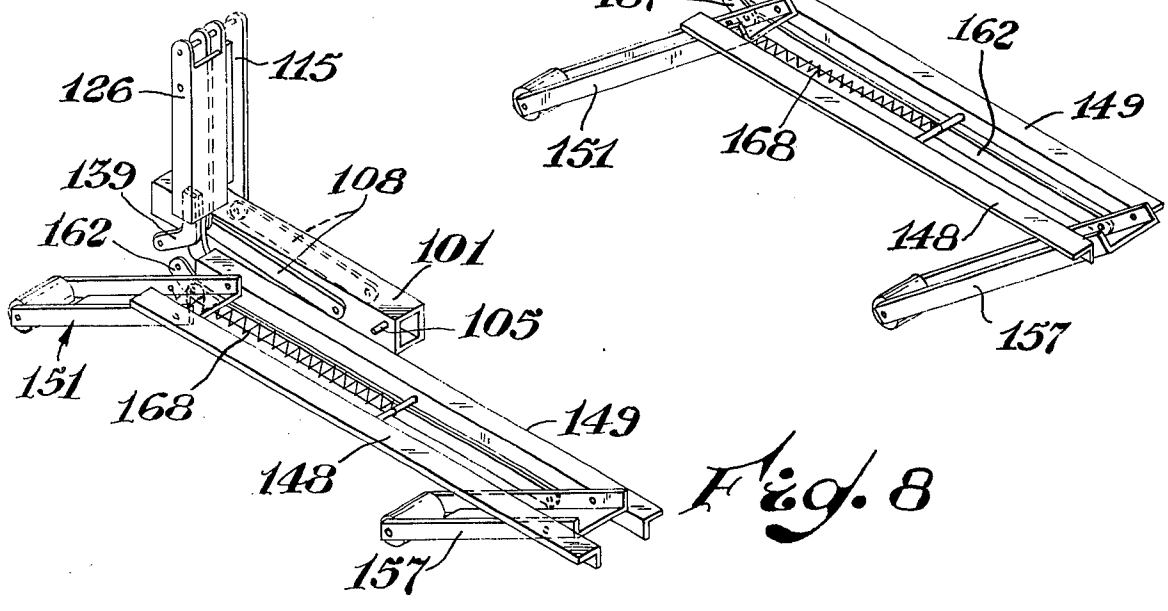


Fig. 8

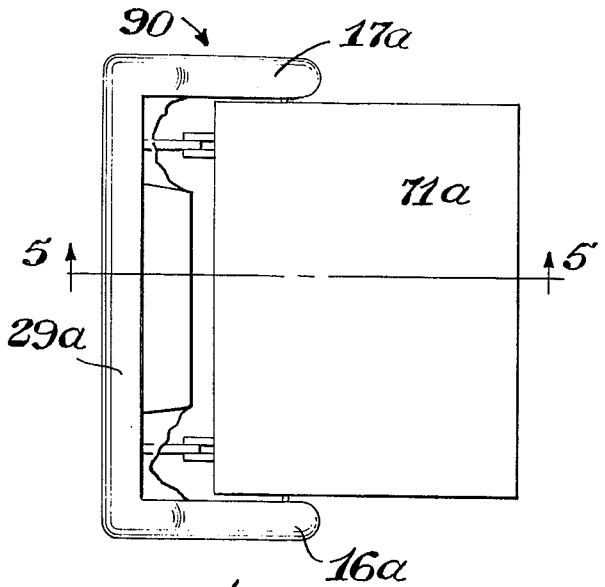


Fig. 4

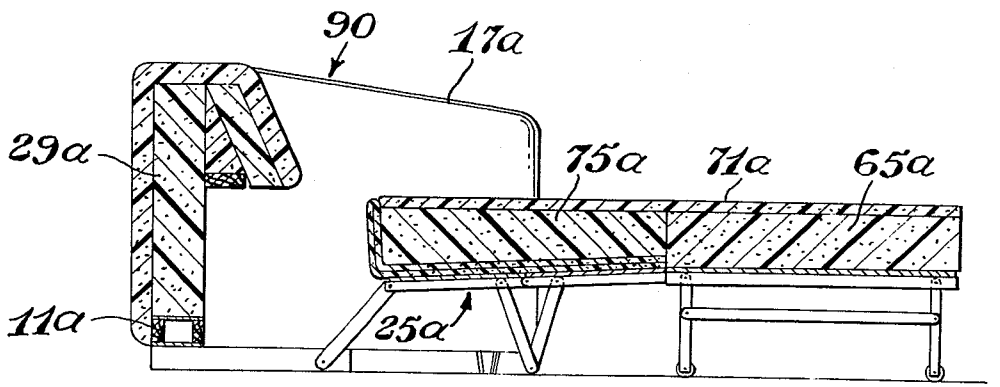


Fig. 5

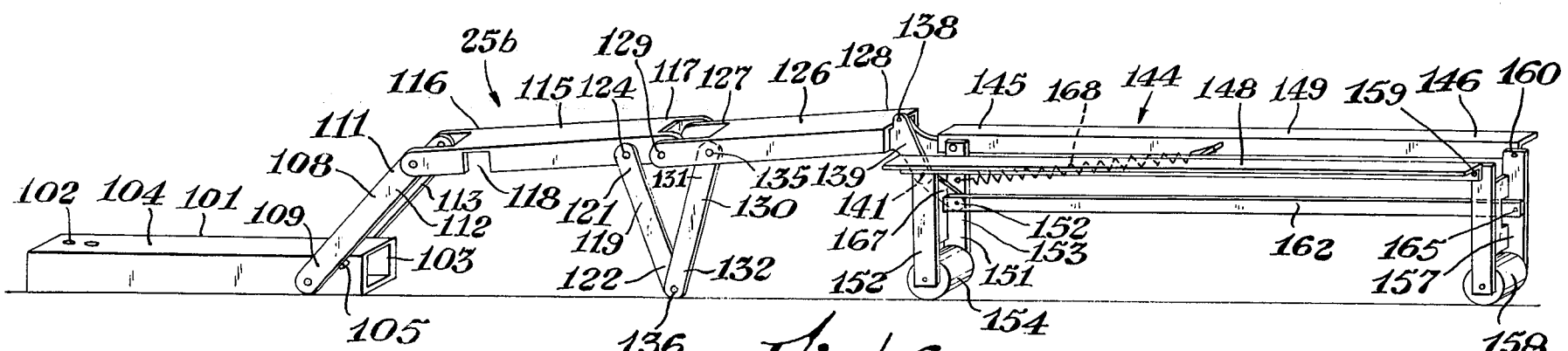


Fig. 6

CONVERTIBLE COUCH AND MECHANISM THEREFOR

In order to maximize living space, many people employ a unit of furniture sometimes referred to as a sofa bed or convertible couch. Such a sofa bed is convertible from a couch or sofa into a single or double bed by rearranging the cushioning and support means. Oftentimes such convertible couches do little more than spread the major cushioning over an adjacent floor portion and in effect provide a sleeping surface substantially lower in height than that of a conventional bed. Such an arrangement can be referred to as a low sleeping surface. Low sleeping surfaces are often considered by many people to be undesirable. This factor may be physical or psychological, but nevertheless usually many people prefer a bed having a normal sleeping height, such as from about 16 to 18 inches above floor level. In many instances, sofa beds or convertible couches are heavy, cumbersome devices with elaborate and sometimes physically hazardous frames and mechanisms which provide a piece of furniture of substantial weight having a mechanism which is rather complex. In recent times, efforts have been made to prepare furniture having a relatively large volume component of resilient foams such as plastic or rubber foams. Generally such foams are resilient and provide desired cushioning for a person sitting or reclining upon the furniture. Such furniture is known in the art and is represented by various pieces and methods shown in the following U.S. Pat. Nos. 3,678,553; 3,740,774; 3,747,134 and 3,751,739. Oftentimes, such foam upholstered furniture is less than desirably comfortable, particularly sofa beds when in the folded, closed or sofa or sitting configuration due to the phenomenon known as "fall off." Generally in such a sofa bed the seating portion consists of two layers of resilient foam placed one on top of the other which, on opening into the bed or sleeping configuration, are positioned in side by side (edge to edge) relationship to provide a mattress. Thus, a person sitting on the furniture when it is in the sofa configuration finds an undesirable lack of support of the legs immediately behind the knees and notices a tendency to pitch forward, i.e. away from the back when one or both of the person's feet are not supported by the floor.

It would be desirable if there were available an improved sofa bed or convertible couch.

It would also be desirable if there were available an improved mechanism for a sofa bed.

It would be further desirable if there were an improved method of construction of a sofa bed employing synthetic foams.

It would also be desirable if there were an improved sofa bed which, on being placed in the bed configuration, has a sleeping surface which at least approximates conventional bed height.

These benefits and other advantages of the present invention are achieved in a sofa bed, the sofa bed comprising a frame, the frame having affixed thereto a positioning mechanism, the positioning mechanism carrying a seating portion, the seating portion comprising at least a first slablike cushioning member and a second slablike cushioning member disposed adjacent thereto, the first and second slablike members each having major faces in generally opposed spaced apart relationship when the cushioning members are in face to face relationship and selectively positionable in face to face or edge to edge relationship, a flexible cushioning layer

interposed between said major surfaces, the flexible layer having an affixed major surface and an opposed major surface, the interposed flexible layer being folded upon itself and affixed to at least a major portion of each of the adjacent major surfaces of the first and second slablike members, the folded portion of the interposed flexible layer being disposed generally adjacent the frame, the flexible layer being generally unconnected to the first and second slablike members generally in the region of the fold of the flexible layer, when the slablike cushioning members are in edge to edge relationship the flexible cushioning layer having a generally planar configuration and being spaced from the positioning mechanism by the slablike cushioning members, the positioning mechanism having means to position the first slablike member remotely from the frame, and the second slablike member being pivotable about the flexible layer generally about 180° to a position adjacent the frame and between the frame and the first slablike member to thereby provide a generally planar sleeping surface, the support mechanism on extension having means to raise the first slab to a higher position when remote from the frame than when adjacent to the frame.

Also contemplated within the scope of the present invention is a mechanism for a sofa bed, the mechanism comprising a first or base member, the base member having pivotally affixed thereto a first pivot arm or extension arm, the extension arm having a first end pivotally affixed to the base member, and a second end remotely disposed therefor, a stop means to limit rotation of the extension arm, about the base member, a first support arm having a first end and a second end pivotally affixed to the second end of the extenesion arm by means of the first support arm first end, the first support arm at the second end, pivotally affixed to a second support member having a first end and a second end, the first end of the second support member being pivotally affixed to the second end of the first support member, the second end of the second support member pivotally affixed to a third support mechanism at the second end of the second support member, and the second end of the second support member in operative combination with the third support member defining a folding leg erecting and retracting means.

Further features and advantages of the present invention will become more apparent from the following specification taken in connection with the drawing wherein:

FIG. 1 is a schematic isometric underneath representation of a sofa bed in accordance with the present invention.

FIG. 2 is a top view of the sofa bed of FIG. 1.

FIG. 3 is a sectional view of the sofa bed of FIG. 2 taken along the line 3—3 thereof.

FIG. 4 is a schematic representation of a top view of a sofa bed such as the sofa bed of FIGS. 1, 2 and 3 in the extended or sleeping configuration.

FIG. 5 is a schematic sectional view of the sofa bed of FIG. 4.

FIG. 6 is a schematic 3-dimensional representation of a positioning assembly suitable for use in sofa beds in accordance with the present invention. The assembly is shown in its fully extended position; that is, the sleeping position.

FIG. 7 is a schematic isometric representation of the positioning assembly of FIG. 6 in a partly open position.

FIG. 8 is a schematic representation of the apparatus of FIGS. 6 and 7 in the closed position with the legs slightly extended.

In FIG. 1 there is schematically illustrated an isometric underneath view of a sofa bed or convertible couch in accordance with the present invention generally designated by the reference numeral **10**. The sofa bed **10** comprises in cooperative combination a frame or fixed support means **11** and a moveable body supporting means **12** having a front, a forward or outer edge **12***a*. The frame **11** has a generally U-shaped configuration consisting of a back portion **13**, a first end portion **14** and a second end portion **15** remotely disposed from the first end portion **14**. The end portions **14** and **15** define upwardly extending arm rests **16** and **17**, respectively, and a back rest portion, not shown. Legs or support members **18** and **19** are affixed to the end members **14** and **15** remote from the back member **13**. Generally adjacent the legs **18** and **19** are affixed stop members **21** and **22**. The stop members **21** and **22** engage detents **21***a* and **22***a*, affixed to the support portion **12**. A first seating portion positioning mechanism **24** is affixed to the back member **13** and to the seating portion **12**. A second positioning mechanism **25** is affixed to the back member **13** and to the support portion **12**. The mechanisms **24** and **25** are disposed generally adjacent the first and second ends **14** and **15**, respectively. Affixed to the seating or body support portion **12** is an operating handle or grip **27**. The grip **27** is disposed generally remote from the back member **13** and from the ends **14** and **15** and is adapted to be manually grasped when it is desired to change the sofa bed from the sitting configuration to the sleeping configuration. As depicted in FIG. **1**, the sofa bed is in the sitting configuration.

FIG. **2** shows a top view of the sofa bed **10** of FIG. **1** in the closed or seating position showing the location of a back or back rest **29** extending generally above the seating or body support portion **12** and between the end portions **14** and **15**. The seating portion **12** has an outer edge **12a** extending between the ends **14** and **15** and remotely disposed from the back **29**.

FIG. **3** depicts an enlarged sectional view of the sofa bed of FIG. **2** taken along the line 3—3 thereof. The U-shaped frame **11** is of hollow box configuration and has a lower member **33** and an upper member **34** connected at their edge portions by a first or outer spacer **35** and a second or inner spacer **36**. Beneficially, the upper and lower members **34** and **33** are constructed of any convenient material such as hardboard, plywood, wood, metal or the like. Affixed to the frame **11** generally adjacent the lower member **33** is the positioning assembly **25** by means of connectors **37** and **38** which rigidly affix the assembly **25** to the frame **11**. The back **29** comprises a first or rigid member **39**. The rigid member **39** beneficially is formed from a synthetic resinous foam which is relatively rigid and provides structural strength to the back portion **29**. Beneficially, the portion **39** is joined to the upper member **34** of the frame **11** beneficially by the use of a suitable adhesive. Affixed to the structural member **39** remote from the frame **11** and generally adjacent to the body supporting portion **12** is a back rest support portion **41** comprising a first wedge-shaped section **43** and a second alternate generally parallelepiped portion **44** to provide a backwardly slanting configuration of the back portion remote from the foam **11**. The portion **43** has a generally triangular configuration having an upwardly pointing apex. Remote from the apex of the portion **43** and generally adjacent the body support portion **12** is a stiffening member **46** extending lengthwise of the back **29**. Advantageously, the stiffener **46** is of plywood or hardboard and joined to the portion **43** by means of adhesives, screws or like other convenient fasteners. A layer **48** of resilient cushioning material such as flexible foam or other cushioning material is disposed over the foam **11**, the member **39** and the portion **44** of the back **29**. The layer **48** is in turn covered with an upholstery fabric **49** which is employed to cover the entire back **29** as well as the generally visible portions of the arms **16** and **17**. Within the arm **16** is depicted a stiffener **51**. The stiffener **51** is a generally planar element extending from the frame **11** upwardly to a location adjacent the uppermost portion of the arm **16**. Beneficially, the stiffener **51** is of hardboard, plywood or like material and tends to transmit lateral shear forces induced in the arm **16** to the leg **15** of the frame **11**. The arm **16** is constructed in a generally similar manner to that of the back **29** having a generally rigid foam core **53** affixed to the leg **15** of the frame **11** and being covered with a layer **54** of flexible foam generally corresponding to the foam **48** of the back **29** which in turn is covered with an upholstery material such as fabric **55**. The body support portion **12** comprises in combination with the positioning mechanism **25** a first generally planar element or support **57** is pivotally attached by means of the positioning mechanism **25** to a second generally planar support element **58**. The elements **57** and **58** are in generally spaced apart parallel relationship and generally upwardly extending adjacent the base **11** and the portion **39** of the back **29**. A third generally planar support element **59** is pivotally affixed to the element **58** by means of the positioning mechanism **25**. The third element **59** is horizontally outwardly extending from the rear portion **13** of the frame **11**. The element **59** has an upwardly facing surface **61**. The surface **61** has an outer edge **62** and an inner edge **63**. The edges **62** and **63** generally extend the entire length of the body support portion **12** as do the planar members **57** and **58**, the edge **62** being disposed remote from the frame portion **13** of the frame **11** and the edge **63** being disposed generally adjacent thereto. Disposed on the surface **61** and beneficially affixed thereto is a first cushioning member **65**. The cushioning member **65** has a generally slab-like configuration and is generally coextensive with the surface **61**. The first element **65** comprises a major body portion **66** and an edge portion **67**. The edge portion **67** beneficially is a cushioning material as is the portion **66**, however, the portion **67** being less readily deformed or stiffer than the portion **66**. The cushioning slab **65** has a generally rectangular cross-sectional configuration and has an upper surface **69** remotely disposed from the surface **61**. A flexible cushioning layer **71** is affixed to a major portion of the surface **69** and extends generally coextensive therewith. The layer **71** defines a fold **72** of about 180°. The layer **71** is affixed to the surface **69** except in the immediate region of the fold generally designated by the reference numeral **73**. The region **73** is disposed generally adjacent the portion **39** of the back **29** and remote from the portion of the first cushioning member **65**. Beneficially,

the cushioning layer **71** is a flexible, air permeable member such as plastic foam, and beneficially of a flexible polyurethane foam. Disposed above the cushioning layer **71** is a second cushioning member **75.** The member **75** has a configuration generally similar to the cushioning member **65** and is generally coextensive with the surface **69.** The member **75** has a first or outer edge **76** and a second or inner edge **77.** Disposed generally adjacent the outer edge **76** is a portion of a less resilient or stiffer cushioning material **78** generally equivalent to the portion **67** of the cushioning member **65.** The height or thickness of the cushioning member **75** is less, adjacent the member **39** of the back **29** than adjacent the outer edge **31,** thus providing an upwardly rearwardly sloping support for a person sitting on the sofa. The cushioning member **75** has a lower surface **79** generally coextensive with the surface **69** of the cushioning member **65.** The surface **69** is generally affixed to the folded cushioning layer **71** with the exception of a region **82** generally oppositely disposed to the region **73** of the cushioning member **65.** The cushioning member **71** provides a hinged connection between the cushioning members **65** and **75** which permits motion about the fold **72** for about 180° of rotation when the seating portion **12** is moved away from the back **29.** Remote from the surface **79** and adjacent to the first edge **76** is disposed a layer of soft cushioning or cosmetic upholstery **84.** Advantageously, the layer **84** engages a body sitting upon the sofa. A particularly desirable configuration for such a cosmetic layer is a folded configuration wherein a single layer is folded along a centerline and a fold such as the fold **85** is outwardly disposed to provide pleasing aesthetic curvature to the terminal edge of the layer **84** exposed to view when the sofa is in the seating position.

In FIG. **4** there is schematically depicted a sofa bed in accordance with the present invention generally designated by the reference numeral **90.** The sofa bed **90** is a schematic representation of a bed such as the sofa bed of FIGS. **1, 2** and **3** which has been opened into the sleeping position. The bed **90** has a back **29***a*, arms **16***a* and **17***a*, positioning mechanisms **24***a* and **25***a* and an exposed body support or sleeping surface **71***a* which is equivalent to the surfaces of the cushioning layer **71** of FIG. **3** which are depicted in contact with each other in FIG. **3.**

In FIG. **5** there is schematically depicted a sectional view of the sofa bed of FIG. **4** taken along the line **5—5** thereof. The view in FIG. **5** depicted a frame **11***a*, a back **29***a*, a positioning mechanism **25***a* in its open position, cushioning members **65***a* and **75***a* having an exposed body supporting or sleeping layer **71***a.*

In FIG. **6** there is schematically represented a positioning mechanism generally designated by the reference numeral **25***b.* The positioning mechanism **25***b* is functionally identical to the positioning mechanisms **24, 24***a*, **25** and **25***a* of FIGS. **1–5.** The positioning mechanism is depicted in its fully extended form; that is, the configuration it has when the sofa bed is in the sleeping configuration. The positioning mechanism comprises in cooperative combination a base member **101.** The base member **101** has a first end **102** and a second end **103.** The base member **101** has an upper surface **104** and an oppositely disposed support surface (not shown) adapted to engage a support such as a floor. A stop member **105** is disposed generally adjacent the second end **103** and projects from a vertically extending surface of the support member **101.** Disposed adjacent the second end of the support member **101** is a pivoting extension member **108.** The member **108** has a first end **109** and a second end **111.** The first end **109** of the pivoting extension member **108** is pivotally affixed to the second end **103** of the support member **101.** The member **108** comprises first and second parallel arms **112** and **113** disposed on opposite sides of the base member **101.** The pivoting extension member **108** as depicted in FIG. **6** can pivot from the position shown against stop **105** to a position wherein the second end **111** of the member **108** is disposed generally adjacent the second end **102** of the base or support member **101.** The extension member **108** can pivot relative to the support member **101** from a position generally parallel and adjacent to member **101** through an arc of between about 110° or 170° to position the second end **111** remote from and above surface **104.** In the member **101** the upper surface **104** of the member **101** are shown openings for the fastening members such as the members **37** and **38** of FIG. **3** into a base such as the base **11** of FIG. **3.** A first positioning means support member **115** is disposed generally adjacent the second end **111** of the member **108.** The first support member **115** has a first end **116** and a second end **117.** As depicted in FIG. **6,** the first support member **115** has a cross-sectional configuration of a channel having the web of the channel generally parallel to the surface **104** of the base member **101** and the flanges of the channel depending downwardly. The first end **116** of the first support member **115** is pivotally affixed to the member **108** at the second end **111.** The first support member **115** is adapted to be affixed to the generally planar support **57** of FIG. **3.** A recess **118** is formed in one web of the first support member **115** adjacent the first end **116.** A first leg **119** having a first end **121** and a second end **122** is disposed adjacent to the second end **117** of the first support member **115** and pivotally affixed thereto by means of a pivot **124.** A second support member **126** having a first end **127** and a second end **128** is disposed generally adjacent the first support member **115** and pivotally affixed thereto by means of a pivot **12.** The members **115** and **126** can be folded together into a generally parallel adjacent position wherein the first end **116** of member **115** is disposed adjacent second end **128** of member **127.** A second leg **130** having a first end **131** and a second end **132** is pivotally affixed to the first end **127** of the second support means **126** by means of a pivot **135.** The second ends **122** and **132** of the legs **119** and **130,** respectively, are pivotally joined by means of a pivot **136.** A four-bar linkage is formed by portions of the support members **115** and **126** lying between pivots **134** and **135** and the first and second legs **119** and **130.** The legs **119** and **130** provide means to maintain the members **115** and **126** in spaced relationship to a floor or the like. The recess **118** is provided in the first member **115** to permit a projecting portion of the pivot **136** to rest therein in a closed position. The support member **126** carries the generally planar support element (not shown) such as the element **58** of FIG. **3.** The second end **128** of the second support means **126** defines a pivot means **138.** Generally adjacent the pivot means **138** is disposed an operating arm **139** having defined therein a pivot means **141.** Disposed adjacent the second end **128** of the second support means **126** is a third support means **144.** The support means **144** has a first end **145** and a

second end **146**. The first end **145** is pivotally affixed to the pivot **138** of the second end **128** of the second support member **126**. The third support means **144** as depicted in FIG. **6** has first and second parallel spaced apart support members **148** and **149** which are affixed to a third generally planar support such as the support **59** of FIG. **3**. Advantageously, the planar support **59** of FIG. **3** maintains the members **148** and **149** in fixed spaced apart relationship. A third leg or folding support means **151** is positioned adjacent the first end **145** of the first support **144**. The third leg **151** comprises first and second parallel arms **152** and **153**, respectively, which are pivotally affixed in spaced apart generally parallel relationship to members **148** and **149**, respectively, remote from their connection with members **148** and **149**. The elongate members **152** and **153** have pivotally supported therebetween a roll **154**. A fourth leg or folding support means **157** of generally identical dimensional configuration is affixed to the second end **146** of the support **144** by means of pivots **159** and **169**. A roller is pivotally supported by the fourth leg **157** remote from the pivots **159** and **160**. The third leg **151** and second leg **157** are connected by means of a link arm **162** which extends parallel to members **149** and **148** and is pivotally connected to the third leg **151** by a pivot **164** and to the fourth leg by the pivot **165**. A four-bar parallelogram linkage is formed by the legs **151, 157**, the connecting link **162** and the member **149**. A link **167** is pivotally affixed to the pivot **141** of the arm **139** and the pivot **164**. The arms **139, 149** and the leg **151** form a third four-bar linkage. A spring or resilient tensioning means **168** is affixed to leg **151** and members **148** and **149**. The spring **168** is tensioned to urge the legs **151** or **157** into an upright position as depicted in FIG. **6**. It must be noted that in the embodiment depicted in FIG. **6**, all pivots have an axis extending perpendicular to a plane generally containing the first, second and third legs.

In FIG. **7** there is depicted a schematic isometric representation of the assembly of FIG. **6** in a partly folded condition wherein the first and second support members **115** and **126** at their second and first ends respectively have been pivoted or jackknifed upwardly partly closing the positioning means toward the sofa configuration. As the second support member **126** is moveable upwardly, the operating lever **139** causes the link **167** to pull or move the third and fourth legs **151** and **157** rearwardly toward the base **101** and out of the vertical position. As the third support member is forced rearwardly, as one would do in attempting to return the sofa bed from a sleeping configuration to a sitting configuration, one ultimately reaches the configuration more or less as depicted.

FIG. **8** shows where the pivoting extension member **108** has been rearwardly folded over the base member **101** and the first and second support members **115** and **126** are folded together in the vertical position extending upwardly away from surface **104** of base member **101**. For clarity of illustration in FIG. **8** the pivot **141** has been disconnected to permit the legs **151** and **157** to depend slightly downwardly from their normal closed position which is shown in FIG. **3**. In the opening or closing of the assembly **25***b* when employed in a sofa bed, the members **148** and **149** are maintained generally parallel to the base member **101**.

In operation of the convertible couch or sofa bed **10** as depicted in FIGS. **1, 2** and **3**, the bed is changed from the sitting configuration to the sleeping configuration by raising upwardly on the handle **27** as shown in FIG. **1** to disengage detents, **21***a* and **22***a*, from stop members **21** and **22** respectively. The seating portion or body support means **12** is then pulled away from the frame **11** with sufficient force to cause the support means **24** and **25** to assume the configuration depicted in FIG. **6**. The cushioning member **75** is then pivoted about the fold **72** about 180° toward the frame **11** to position the cushioning members in the manner depicted in FIG. **5**. When it is desired to transform the convertible couch from the sleeping configuration to the sitting configuration the cushioning member **75** is folded upwardly through an arc of about 180° into the position depicted in FIG. **3**. The seating portion is then positioned toward the frame **11** until the positioning means **24** and **25** assume the configuration as depicted in FIG. **3**. The resilient tensioning means or spring **168** serves to aid in the unfolding of leg members **151** and **157** as the sofa bed is being opened and by proper selection of the tension of spring **168** relative to the weight of the seating portion the sofa bed can be changed from the sleeping to the sitting configuration and vice versa with minimal physical effort. The sofa bed of the present invention is particularly desirable in that it is opened or closed by a person positioned generally above the handle **27** and away from the operating mechanism. Thus, the convertible couch of the present invention minimizes any safety hazard to the person opening or closing it when compared to other convertible couches which have exposed mechanisms in which a hand may be pinched or otherwise damaged.

The upholstery of the couches in accordance with the present invention beneficially may be prepared in accordance with well known procedures. It is particularly desirable and advantageous to employ composite foams such as those that are commercially available employing an open-celled polyurethane matrix containing expanded polystyrene or styrene polymer particles. Such composite foams are well known and are set forth in U.S. Pat. Nos. 3,251,916; 3,503,840; 3,509,079; 3,607,797; 3,662,043; and 3,663,469 the teachings of which are herewith incorporated by reference thereto. Advantageously such composite foams are readily prepared in almost any desired degree of resiliency. If, for example, a foam layer such as the layers **71, 84** and **48** as shown in FIG. **3**, are of open-celled polyurethane foam containing either no expanded polystyrene foam particles or up to about **5** volume percent polystyrene particles, the principal cushioning portion such as the portions **44, 65** and **75** beneficially are of similar composition but contain from about 4 to 12 volume percent expanded styrene polymer particles whereas the more rigid portions such as the edges **67** and **78** contain from about **10** to **15** volume percent expanded resilient polystyrene particles. The structural or load supporting portions of the sofa bed such as the back portion **39**, the wedge portion **43** and the arm structure **53** utilize composite foam containing from about 15 to 55 volume percent of the expanded polystyrene particles. Thus, as the proportion of expanded polystyrene particles is increased, the rigidity of the foam is increased. Such composite foams are well known and are commercially available.

Although convertible couches in accordance with the present invention are beneficially prepared employing composite foams, other cushioning and upholstery ma-

terial may also be employed including the foams of rubber, both synthetic and natural. The suitability of any particular cushioning or upholstery material or any particular location in the convertible couches of the present invention is readily determined by means of the identation load deflection. The indentation load deflection is meant the force in pounds per square inch to cause the cushioning material to be compressed to a thickness which is a specified percentage of its original thickness. Most commonly these values are taken at 25 percent compression and at 65 percent compression. The force required for compression of 25 percent, that is to a thickness of 75 percent of the original thickness, is an indication of the initial softness of the foam; while the value at 65 percent compression, that is to a thickness of 35 percent of the original thickness of the foam, is indicative of its load bearing characteristics. For example, a foam having a low identation load deflection at both 25 percent and 65 percent is soft and compresses readily and is usually not desirable as the only cushioning element employed over a hard surface. Generally for use in a convertible couch in accordance with the present invention a structural foam such as components **39** and **53** of FIG. **3** have a 25 percent indentation load deflection of 50 pounds per 50 square inches as a minimum value and a 65 percent minimum value of 250 pounds per 50 square inches. Advantageously, a minimum **65** percent value is 400 pounds per 50 square inches or greater. Beneficially such relatively rigid foams may also be used for edges **67** and **78** of FIG. **3**. Components such as components **65, 75** and **44** of the couch of FIG. **3** have a indentation load deflection of from about **18** to **35** pounds per 50 square inches, and beneficially from about 22 to 28 pounds per 50 square inches and a 65 percent indentation load deflection of 63 to 122 pounds per square inches and preferably from about 84 to 122 pounds per 50 square inches. A more flexible foam is required for portions of the convertible couch of the invention indicated in FIG. **3** by reference numerals **48, 54, 71** and **84** and such a material has indentation load deflection of from about 10 to 30 pounds per 50 square inches at 25 percent and beneficially from 10 to 15 pounds per 50 square inches. At 65 percent compression the value is from 18 to 54 pounds per 50 square inches and preferably from 18 to about 27 pounds per 50 square inches.

Convertible couches prepared in the foregoing manner with composite foams are extremely sturdy and light in weight. Oftentimes in order to provide the desired mass that is usually expected of a piece of furniture of the size of the sofa bed of the present invention, it is desirable to fill or at least partially fill the hollow frame **11** with a material such as sand.

As is apparent from the foregoing specification, the present invention is susceptible of being embodied with various alterations and modifications which may differ particularly from those that have been described in the preceding specification and description. For this reason, it is to be fully understood that all of the foregoing is intended to be merely illustrative and is not to be construed or interpreted as being restrictive or otherwise limiting of the present invention.

What is claimed is:

1. A sofa bed, the sofa bed comprising
a frame, the frame having affixed thereto
a positioning mechanism, the positioning mechanism carrying
a seating portion, the seating portion comprising at least
a first slab-like cushioning member and
a second slab-like cushioning member disposed adjacent thereto, and selectively positionable in face to face or edge to edge relationship, the first and second cushioning members each having major faces in generally opposed spaced apart relationship when the cushioning members are in face to face relationship,
a flexible cushioning layer interposed between said major surfaces, the flexible cushioning layer having
an affixed major surface and
an opposed major surface, the flexible cushioning layer comprising generally a layer of cushioning material folded upon itself at
a folded portion and the flexible cushioning layer affixed to at least a major portion of each of the adjacent major surfaces of the first and second cushioning slabs,
the folded portion of the flexible cushioning layer beng disposed generally adjacent to the frame,
the flexible layer being generally unconnected to the first and second cushioning members in the region of the fold of the flexible layer,
when the cushioning members are in edge to edge relationship the flexible cushioning layers having a generally planar configuration and being spaced from the positioning mechanism by the cushioning members,
the positioning mechanism capable of positioning the first cushioning member remotely from the frame, and
the second cushioning member being pivotable about the flexible cushioning layer generally about **180°** to a position adjacent to the frame and between the frame and the first cushioning layer to thereby provide a generally planar sleeping surface and
the support mechanism on extension raising the first slab to a higher position when remote from the frame then when adjacent to the frame.

2. The sofa bed of claim **1** wherein the cushioning members are of synthetic resinous foam.

3. The sofa bed of claim **1** wherein each of the cushioning elements has a less resilient portion disposed along one edge thereof with the further limitation that the less resilient portions are in generally parallel and adjacent relationship when the cushioning elements are in face to face relationship.

4. The sofa bed of claim **1** including a back portion affixed to the frame.

5. The sofa bed of claim **4** including arm portions affixed to the frame.

6. The sofa bed of claim **5** wherein the back and arms comprise synthetic foam.

7. The sofa bed of claim **1** wherein the cushion members comprise composite foam.

8. The sofa bed of claim **6** wherein the cushioning members, back and arms comprise composite foam.

9. A sofa bed, the sofa bed comprising
a frame, the frame having affixed thereto
a positioning mechanism, the positioning mechanism carrying
a seating portion, the seating portion comprising at least
a first foam plastic slab and

a second foam plastic slab disposed adjacent the first foam plastic slablike cushioning members, the first and second foam plastic members each having major faces in generally opposed spaced apart relationship,

a flexible foam layer interposed between said major surfaces, the flexible foam having an

affixed major surface and

an opposed major surface, the interposed flexible foam comprising generally a layer of foam folded upon itself and having a folded portion of the flexible foam being affixed to at least a major portion of each of the adjacent major surfaces of the first and second foam slabs, the folded portion of the interposed flexible foam being disposed generally adjacent the frame,

the flexible foam being unaffixed to the first and second foam slabs generally in the region of the fold of the flexible foam, the positioning mechanism being capable of selectively positioning the first foam slab remotely from the frame, and

the second foam slab being pivotable about the flexible foam folded portion generally about **180°** to a position adjacent the frame and between the frame and the first foam slab to thereby provide a generally planar sleeping surface, a pair of generally parallel support mechanisms connecting the seating portions of the frame each of the mechanisms having

a base member affixed to the frame wherein each of the mechanisms comprise

a first or base member, the base member having pivotally affixed thereto

a first pivot or extension arm, the extension arm having a first end pivotally affixed to the base member and a second end remotely disposed therefore,

a stop means to limit rotation of the extension arm about the base member,

a first support arm pivotally affixed to the second end of the extension arm by means of

a first support arm first end,

a first support arm second end,

a second support member having

a first end and

a second end, the first end of the second support member being pivotally affixed to the second end of the first support member, a first leg member having a first end and second end, the first end of the first leg being pivotally affixed to the first support member,

a second leg member pivotally affixed to the second support member by means of the first end of the second leg member, the second ends of the first and second leg members being pivotally affixed to each other, thereby providing

a four-bar linkage which comprises a portion of the first support member ajacent its second end, a portion of the second support member adjacent its first end and the first and second leg members, the second support member having

a second end pivotally affixed to

a third support member, the second end of the second support member defining

an erecting lever, the third support member having

a first end and

a second end, the first end being pivotally affixed to the second end of the second support member, the third support member having pivotally affixed thereto

a third leg adjacent the first end of the third support member,

a fourth leg pivotally affixed to the second end of the third support member, the third leg and the fourth leg at a location generally adjacent the third support member being pivotally affixed to

a leg actuating member, the leg actuating member, a third support and the third and fourth leg portions lying between the points of pivotal attachment to the third support member and the leg actuating member forming a parallelogram four-bar linkage,

a link member pivotally affixed to the second support member actuating lever and the leg actuating member with the further limitation that all pivotal connections have generally parallel axes of pivotal motion and that when first, second and third support members are disposed in a generally colinear arrangement, the second ends of the first and second legs and portions of the third and fourth leg members remote from the third support member lie generally in a plane containing the lowermost portion of the base member with the further limitation that the first, second and third support members of each mechanism have affixed thereto the first, second and third generally planar support elements respectively, the first, second and third planar support elements extending generally lengthwise of the frame and being angularly positionable relative to each other.

10. The sofa bed of claim **9** wherein the cushioning elements are of composite synthetic resinous foam.

11. The sofa bed of claim **9** wherein each of the cushioning elements has a less resilient portion disposed along one edge thereof with the further limitation that the less resilient portions are in generally parallel and adjacent relationship when the cushioning elements are in face to face relationship.

12. The sofa bed of claim **9** a back portion and arm portions affixed to the frame.

13. The sofa bed of claim **12** wherein the back and arms comprise synthetic foam.

14. A mechanism for a sofa bed, the mechanism comprising

a first or base member, the base member having pivotally affixed thereto

a first pivot arm or extension arm, the extension arm having a first end pivotally affixed to the base member and a second end remotely disposed therefore,

a stop means to limit rotation of the extension arm about the base member,

a first support arm having a first end and a second end pivotally affixed to the second end of the extension arm by means of the first support arm first end, the first support arm second end, pivotally affixed to a second support member having a first end and a second end, the first end of the second support member being pivotally affixed to the second end of the first support member,

a folding support means pivotally disposed adjacent the second end of the first support member, and the first end of the second support member, the second end of the second support member pivotally affixed to

a third support member at the second end of the second support member

in operative combination with the third support member means defining

a folding leg erecting and retracting means.

15. The mechanism of claim **14** wherein the folding leg erecting mechanism comprises a parallelogram four-bar linkage opened and closed by rotation of the third support member relative to the erecting and retracting means.

16. The mechanism of claim **15** including means to resiliently tension the four-bar linkage into a leg erecting position.

17. The mechanism of claim **16** wherein the means to resiliently tension is a spring.

18. The mechanism of claim **14** wherein the folding support means comprises a first leg member pivotally affixed to the first support member, a second leg member pivotally affixed to the second support member, the first and second support members being pivotally attached remote from the first and second support means to form a four-bar linkage.

19. A mechanism for a sofa bed, the mechanism comprising

a first or base member, the base member having pivotally affixed thereto

a first pivot arm or extension arm, the extension arm having a first end pivotally affixed to the base member and a second end remotely disposed from the first end,

a stop means to limit rotation of the extension arm about the base member,

a first support arm pivotally affixed to the second end of the extension arm by means of

a first support arm second end pivot,

a second support member having a first end and a second end, the first end of the second support member being pivotally affixed to the second end of the first support member,

a first leg member pivotally affixed to the first support member, the first leg member having a first end and second end, the first end of the first leg being pivotally affixed to the first support member,

a second leg member pivotally affixed to the second support member by means of the first end of the second leg member, the second ends of the first and second leg members being pivotally affixed to each other, thereby of the third and fourth leg members remote from the third providing a four-bar linkage which comprises a portion of the first support member adjacent its second end, a portion of the second support member adjacent its first end and the first and second leg members, the second support member having a second end pivotally affixed to

the second end of the second support member defining

an erecting lever,

a third support mechanism having a third support member, the third support member having a first end and a second end, the first end of the third support member being pivotally affixed to the second end of the second support member

a third leg adjacent the first end of the third support member and pivotally affixed thereto,

a fourth leg adjacent the second end of the third support member, the third leg and the fourth leg at a location generally adjacent the third support member being pivotally affixed to

a leg actuating member, the leg actuating member, the third support member and the third and fourth leg portions lying between the points of pivotal attachment to the third support member and the leg actuating member forming a parallelogram four-bar linkage,

a link member pivotally affixed to the second support member actuating lever and to the leg actuating member with the further limitation that all pivotal connections have generally parallel axes of pivotal motion and that when first, second and third support members are disposed in a generally colinear arrangement, the second ends of the first and second legs and portions of the third and fourth leg members remote from the third support member lie generally in a plane containing the lowermost portion of the base member.

* * * * *